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(54) **A CONNECTOR FOR LINEAR LIGHTING DEVICES AND LINEAR LIGHTING SYSTEM COMPRISING THIS CONNECTOR**

(57) A connector for linear lighting devices, comprising:
- a first and a second C-shaped connector part (14, 16), which can be snap-engaged with each other,
- at least one connecting pin (28) protruding from an inner surface of one of said connector parts (14),
- at least one conductive element (30) contained within the thickness (T) of said connector part (14) and electrically connecting said at least one connecting pin (28) to a connection point (32, 38) with a power supply cable (36).

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Description

Technical field

[0001] The present description relates to a connector for lighting devices.

[0002] One or more embodiments may refer to connectors for flexible linear lighting devices that use solid-state light radiation sources, such as LED sources.

[0003] One or more embodiments may concern connectors with an IP degree of protection for flexible linear lighting devices with IP protection.

[0004] One or more embodiments may also concern a lighting system comprising such a connector applied to a linear lighting device.

Technological background

[0005] In the field of lighting systems, the use of linear lighting devices or modules having an elongated shape, for example ribbon-like, which may comprise a flexible printed circuit having the shape of a thin elongated ribbon on which a plurality of solid state light radiation sources, for example LEDs, is widespread.

[0006] Linear lighting devices can be provided with an IP degree of protection, which can be obtained, for example, by a coating of polymeric material applied onto the printed circuit and on the light radiation sources.

[0007] In the case of linear lighting devices with IP protection, one of the problems to be solved is the implementation of an electrical connection that gives users the possibility of connecting the connector not only to the ends of the linear lighting device but also to intermediate positions along the length of the linear lighting device. In particular, it may be desirable to provide connectors that can guarantee an IP6X degree of protection.

[0008] A further requirement may be that of avoiding cumbersome dimensions of the connector, for example, under the linear lighting device, in order to make the presence of the connector as less invasive as possible in the final application.

[0009] The most widespread existing solutions can provide plug-in connectors at one end of the linear lighting device. The existing connectors are often only plugged-in at the ends of the linear lighting device, where the female part of the connector is co-printed, glued or fixed by means of any other method that can guarantee an adequate IP degree of protection.

[0010] One of the biggest problems of existing solutions are the large external dimensions of the connectors, so that in the final application, the connector may have a strong visual impact, thus giving rise to a bad appearance. The large dimensions of the connector compared to the linear lighting device often require the user to prepare a dedicated space for housing the connector, for example, an empty space or cavity on the installation surface. This can make installation of the connector difficult.

[0011] Some existing solutions may allow the connector to be plugged-in at different positions along the linear lighting device. These solutions can also be affected by the inconvenience of large overall dimensions due to the cables arranged on the lower surface, and the technology used to connect the electrical power supply cable to the connecting pins. These solutions can also, therefore, disturb the installation.

[0012] Furthermore, the technology used to connect the cables to the connecting pins may require a large space so that only two contacts may be available in the area available for connection (between one linear lighting device and the next). This can mean that connectors of this type may only be suitable for linear white or monochromatic LED lighting devices, having only two poles.

Object and summary

[0013] One or more embodiments intend to contribute to overcoming the drawbacks outlined above.

[0014] More specifically, one or more embodiments aim to provide a connector for linear lighting devices with a small footprint, and which can be applied in various positions along the linear lighting device.

[0015] One or more embodiments aim to provide connectors for linear lighting devices with IP protection, which allow IP6X protection to be obtained.

[0016] According to one or more embodiments, these objects can be achieved by a connector for linear lighting devices having the characteristics referred to in the following claims.

[0017] One or more embodiments may also concern a lighting system comprising such a connector applied to a linear lighting device.

[0018] The claims form an integral part of the technical disclosure provided here in relation to the invention.

Brief description of the figures

[0019] One or more embodiments will be now described, purely by way of non-limiting example, with reference to the attached figures, wherein:

- Figure 1 is a perspective view of an embodiment of a connector applied to a linear lighting device,
- Figure 2 is a perspective view of an embodiment of the connector indicated by the arrow II in Figure 1,
- Figure 3 is a perspective view of a detail indicated by the arrow III in Figure 2,
- Figures 4 and 5 are perspective views illustrating an embodiment of a technique for connecting electrical cables to a connector,
- Figure 6 is a perspective view illustrating an embodiment of an alternative technique for connecting electrical cables to a connector, and
- Figure 7 is a perspective view illustrating a variant of Figure 1.

[0020] It will be appreciated that, for clarity and simplicity of illustration, the various figures may not be reproduced on the same scale.

Detailed description

[0021] In the following description various specific details are illustrated aimed at a thorough understanding of examples of one or more embodiments. The embodiments can be implemented without one or more of the specific details, or with other methods, components, materials, etc. In other cases, known structures, materials, or operations are not shown or described in detail to avoid obscuring various aspects of the embodiments. The reference to "an embodiment" in the context of this description indicates that a particular configuration, structure or characteristic described in relation to the embodiment is included in at least one embodiment. Therefore, phrases such as "in an embodiment", possibly present in different places of this description do not necessarily refer to the same embodiment. Moreover, particular conformations, structures or characteristics can be combined in any suitable manner in one or more embodiments and/or associated with the embodiments in a different way from that illustrated here, for example, a characteristic exemplified here in relation to a figure may be applied to one or more embodiments exemplified in a different figure.

[0022] The references used here are only for convenience and do not therefore define the field of protection or the scope of the embodiments.

[0023] In Figures 1 and 2, the reference 10 indicates a connector for a linear lighting device 12. The linear lighting device 12 may comprise a plurality of solid state light radiation sources (SSL), for example, LED sources. The lighting device 12 may have an outer coating of polymeric material which gives the lighting device 12 an IP degree of protection, for example IP6X. The connector 10 can be inserted at dedicated connection areas distributed along the length of the linear lighting device 12.

[0024] In one or more embodiments, the connector 10 may comprise a first connector part 14 and a second connector part 16. In one or more embodiments, the first connector part 14 and the second connector part 16 can be C-shaped, and can be applied to opposite sides of the linear lighting device 12. The first connector part 14 and the second connector part 16 may be provided with mutually cooperating snap-engagement formations, which may allow snap-fastening of the first connector portion 14 to the second connector portion 16. In one or more embodiments, the snap-engagement formations may comprise a pair of teeth 18 protruding from a connector part, for example, from the first connector part 14, which snap-engage corresponding seats formed in the other connector part, for example, in the second connector part 16.

[0025] In one or more embodiments, the first connector part 14 may have a base wall 20 and two side walls 22, arranged according to a general C-shape. The side walls 22 may be perpendicular to the base wall 20. In one or more embodiments, the second connector part 16 may have a shape similar to that of the first connector part 14, with a base wall 24 and two side walls 26. In one or more embodiments, the side walls 22 of the first connector part 14 and the side walls 26 of the second connector part 16 may have respective front surfaces in contact with each other. In one or more embodiments, the snap-engagement teeth 18 may protrude from the front surfaces of the side walls of the first connector part 14 and may snap-engage corresponding openings formed in the side walls 26 of the second connector part 16.

[0026] In one or more embodiments, in the condition in which the two connector parts 14, 16 are engaged, the connector 10 may have a general O-shape, with a central through-opening through which the linear lighting device 12 can extend. The snap connection between the two connector parts 14, 16 may provide an appropriate mechanical retention force of the connector 10 on the linear lighting device 12. In one or more embodiments, it may be possible to ensure an adequate IP degree of protection, for example, IP6X. The two connector parts 14, 16 can be formed of molded plastic material, for example, transparent, opaque, colored, semitransparent, dark, etc.

[0027] In one or more embodiments, the first connector part 14 can be applied to the lower part of the linear lighting device 12, with the base wall 20 resting on the lower surface of the linear lighting device 12 and the side walls 22 located along opposite sides of the linear lighting device 12. The second connector part 16 can be placed on the upper part of the linear lighting device 12. The terms "lower" and "upper" only refer to the position illustrated in the figures and do not concern the assembled position of use of the lighting device 12. The part of the lighting device 12 indicated as "upper part" can be the part from which the light radiation is emitted.

[0028] With reference to Figure 2, the connector may comprise at least one connecting pin 28. In one or more embodiments, the connecting pin 28 may protrude from the inner surface of the first connector part 14. In one or more embodiments, said at least one connecting pin 28 may protrude from an inner surface of the base wall 20 of the first connector part 14.

[0029] In one or more embodiments, the connector 10 may comprise a plurality of connecting pins 28. In the illustrated example, the connector 10 may comprise two connecting pins 28. In one or more embodiments, the connector 10 may comprise 4, 5, 6 or even more connecting pins 28, so that the connector 10 can be coupled to adjustable white, RGB, or RGBW lighting devices.

[0030] In one or more embodiments the connecting pins 28 can be pointed and can perforate the outer insulating coating of the linear lighting device 12 when the two casing parts 14, 16 are snap-fitted together. The connecting pins 28 can penetrate inside the linear lighting device 12 and establish an electrical connection with conductive portions of the lighting device 12 located inside

the outer insulating coating.

[0031] Again with reference to Figure 2, in one or more embodiments, the connector 10 may comprise at least one conductive element 30 electrically connected to at least one connecting pin 28. In one or more embodiments, said at least one conductive element 30 can be contained within the thickness T of said first connector part 14.

[0032] Said at least one conductive element 30 can electrically connect said at least one connecting pin 28 with at least one electrical connection point, formed for example, by a terminal 32. In one or more embodiments, said terminal 32 can be formed by a front surface of the conductive element 30. In one or more embodiments, said terminal 32 of said conductive element 30 can be located on an outer surface of a side wall 22 of a connector part 14.

[0033] In one or more embodiments, the connector 10 may comprise a plurality of conductive elements 30. The number of conductive elements 30 can be equal to the number of connecting pins 28.

[0034] In one or more embodiments, the conductive elements 30 can be formed of metal strips. In one or more embodiments, the conductive elements can be made in the form of a metal frame.

[0035] In one or more embodiments, the plastic material forming the body of the first connector part 14 can be co-molded onto said at least one conductive element 30, so that said at least one conductive element may remain incorporated within the molded plastic material.

[0036] In one or more embodiments, said at least one conductive element 30 can be housed within a respective groove formed in the plastic body of the first connector part 14.

[0037] The electrical connection between the connecting pins 28 and the respective terminals 32 is not formed by electric cables (as in the solutions according to the prior art). The solution with conductive elements 30 co-molded inside the body of the respective connector part 14 or inserted into grooves formed in the respective connector part 14 can enable a strong reduction in the dimensions of the connector 10, especially in its thickness T, given that the conductive elements 30 can be contained within the thickness T. The solution that envisages co-molding of the conductive elements 30 inside the body of the connector part 14 may allow the production of connectors 10 with IP protection. The solution in which the conductive elements 30, for example, in the form of strips or metal plates, can be housed within respective grooves or cavities, can be used in the case where it is not necessary to obtain an IP protection.

[0038] With reference to Figure 3, in one or more embodiments the inner surface of the base wall 20 of the first connector part 14 may have at least one circular rib 34 surrounding said at least one connecting pin 28. The rib 34 can form a sealing gasket which can cooperate with a surface of the linear lighting device 12 in order to provide IP protection.

[0039] In one or more embodiments, the conductive elements 30 of the connector 10 can be connected to an electrical power supply cable 36. The power supply cable 36 can be a single cable, or may be formed of a plurality of independent electric wires. In one or more embodiments, the electrical connection between the conductive elements 30 and the electrical power supply cable 36 can be implemented in one of the following ways:

1) the ends of the power supply cable 36 can be welded directly to the respective conductive elements 30, and the welding zones can then be molded inside the plastic material forming the body of the respective connector part 14 (Figure 1);
2) the ends of the power supply cable 36 can be crimped onto the conductive elements 30 at crimping points 38 (Figure 6), and the crimping points 38 can be incorporated inside the plastic material forming the body of the respective connector part 14;
3) the terminals 32 of the conductive elements 30 can be exposed on the outer surface of the side wall 22 (Figure 4); the connection of the electrical power supply cable 36 - in this case - can be carried out directly by the end user, for example, by means of welding and filling material 40 (Figure 5) (for example, silicone), which can be applied to a cavity 41 of the side wall 22 for covering the welding zones and providing the required IP degree of protection.

[0040] In one or more embodiments, the volume due to the connections with the electrical power supply cables 36 can be formed on one side of the connector 10. In this way, the thickness of the connector 10 on the part intended to be applied on the lower part of the lighting device 12 can be minimal, and the ripple effect on a planar installation of the linear lighting device 12 due to the presence of the connector can also be minimal.

[0041] In one or more embodiments, one or both of the connector parts 14 may be formed of transparent material in order to minimize the visibility of the connector 10.

[0042] As illustrated in Figure 7, in one or more embodiments, the connector 10 can be applied to the linear lighting device 12 in an overturned condition with respect to the one shown in Figure 1, with the connector part 14 carrying the connecting pins 28 located on the upper part of the linear lighting device 12. The connector part 14 carrying the connecting pins 28 could - in this case - be made of transparent material to minimize the visibility of the connector.

[0043] One or more embodiments may have one or more of the following advantages:

- thanks to the reduced dimensions of the connector, especially below the linear lighting device, the connector does not bend the linear lighting device when the system is installed on a flat surface;
- the connector can be applied along flexible linear lighting devices with IP protection, even in the case

of lighting devices with more than two poles, for example, it is possible to connect the connector to linear RGB, adjustable white and RGBW lighting devices;

- the connector is easy to install and has a pleasing appearance because the cross-sectional dimensions of the connector are substantially similar to the cross-sectional dimensions of the linear lighting device;
- the connector may be compatible for mounting on the upper or lower part of the linear lighting device (existing linear lighting devices with connecting areas on the upper surface of the device are compatible with the connection from above);
- the connector can be lightweight and compact so that no large spaces need to be reserved during its installation;
- the lighting device can be cut to the required length, and the connector can also be connected to scrap pieces;
- the connector can guarantee sufficient mechanical retention by means of the mutual fastening of the two connector parts;
- the connector can guarantee a required IP degree of protection.

[0044] One or more embodiments can, therefore, concern a connector for linear lighting devices, comprising:

- a first and a second C-shaped connector part (e.g. 14, 16), which can be snap-engaged with each other,
- at least one connecting pin (e.g. 28) protruding from an inner surface of one of said connector parts (e.g. 14),
- at least one conductive element (e.g. 30) contained within the thickness (e.g. T) of said connector part (e.g. 14) and electrically connecting said at least one connecting pin (e.g. 28) to a connection point (e.g. 32, 38) with a power supply cable (e.g. 36).

[0045] In one or more embodiments, said connector part (e.g. 14) can have a base wall (e.g. 20) and two side walls (e.g. 22) arranged according to a C-shape, said at least one connecting pin (e.g. 28) may protrude from an inner surface of said base wall (e.g. 20) and said electrical connection point (e.g. 32, 38) can be located on one of said side walls (e.g. 22).

[0046] In one or more embodiments, a plastic material forming said connector part (e.g. 14) can be co-molded onto said conductive element (e.g. 30).

[0047] In one or more embodiments, said at least one conductive element (e.g. 30) can be housed within a respective groove formed in said first connector part (e.g. 14).

[0048] In one or more embodiments, said at least one conductive element (e.g. 30) can be welded to one end of a respective electrical power supply cable (e.g. 36).

[0049] In one or more embodiments, a welding zone between said at least one conductive element (e.g. 30) and the end of the respective power supply cable (e.g. 36) can be co-molded inside said first connector part (e. g. 14).

[0050] In one or more embodiments, said at least one conductive element (e.g. 30) can be crimped onto one end of a respective electrical power supply cable (e.g. 36).

[0051] In one or more embodiments, a crimping zone (e.g.38) between said conductive element (e.g. 30) and the end of the respective electrical power supply cable (e.g. 36) can be co-molded inside said first connector part (e.g. 14).

[0052] In one or more embodiments, one end (e.g. 32) of said at least one conductive element (e.g. 30) may be exposed on an outer surface of a side wall (e.g. 22) of said first connector part (e.g. 14).

[0053] In one or more embodiments said at least one conductive element (e.g. 30) can be formed of a metal strip.

[0054] In one or more embodiments at least one of said first and second connector parts (e.g. 14, 16) can be made of transparent material.

[0055] In one or more embodiments, an inner surface of said first connector part (e.g. 14) may have at least one circular integral rib (e.g. 34) surrounding said at least one connecting pin (e.g. 28), and forming a sealing gasket.

[0056] In one or more embodiments, the connector may comprise a plurality of connecting pins (e.g. 28) protruding from said inner surface of said first connector part (e.g. 14), and electrically connected to respective electrical connection points (e.g. 32, 38) through respective conductive elements (e.g. 30).

[0057] One or more embodiments may concern a lighting system comprising a linear lighting device (e.g. 12) and a connector according to one or more embodiments applied along the length of said linear lighting device (e. g. 12).

[0058] Of course, without prejudice to the underlying principles of the invention, the details of construction and the embodiments may vary, even significantly, with respect to those illustrated here, purely by way of non-limiting example, without departing from the scope of the invention.

[0059] This field of protection is defined by the attached claims.

LIST OF REFERENCE SIGNS

connector	10
linear lighting device	12
first connector part	14
second connector part	16
teeth	18
base wall	20
side walls	22
base wall	24
side walls	26

(continued)

connecting pin	28
conductive element	30
terminal	32
circular rib	34
power supply cable	36
crimping points	38
filling material	40
cavity	41

Claims

1. A connector for linear lighting devices, comprising:

- a first and a second C-shaped connector part (14, 16), which can be snap-engaged with each other,
- at least one connecting pin (28) protruding from an inner surface of one of said connector parts (14),
- at least one conductive element (30) contained within the thickness (T) of said connector part (14), and electrically connecting said at least one connecting pin (28) to a connection point (32, 38) with a power supply cable (36).

2. A connector according to claim 1, wherein said connector part (14) has a base wall (20) and two side walls (22) arranged according to a C shape, wherein said at least one connecting pin (28) protrudes from an inner surface of said base wall (20) and wherein said electrical connection point (32, 38) is located on one of said side walls (22).

3. A connector according to claim 1 or claim 2, wherein a plastic material forming said connector part (14) is co-molded onto said at least one conductive element (30).

4. A connector according to claim 1 or claim 2, wherein said at least one conductive element (30) is housed within a respective groove formed in said first connector part (14).

5. A connector according to any of the preceding claims, wherein said at least one conductive element (30) is welded to one end of a respective power supply cable (36).

6. A connector according to claim 5, wherein a welding zone between said at least one conductive element (30) and the end of the respective power supply cable (36) is co-molded inside said first connector part (14).

7. A connector according to any one of claims 1 to 4, wherein said at least one conductive element (30) is crimped on one end of a respective power supply cable (36) .

8. A connector according to claim 7, wherein the crimping zone (38) between said at least one conductive element (30) and the end of the respective power supply cable (36) is co-molded inside said first connector part (14).

9. A connector according to any of claims 1-4, wherein one end (32) of said at least one conductive element (30) is exposed on an outer surface of a side wall (22) of said first connector part (14).

10. A connector according to any of the preceding claims, wherein said at least one conductive element (30) is formed by a metal strip.

11. A connector according to any of the preceding claims, wherein at least one of said first and second connector parts (14, 16) is made of transparent material.

12. A connector according to any one of the preceding claims, wherein an inner surface of said first connector part (14) has at least one circular integral rib (34) surrounding said at least one connecting pin (28) and forming a sealing gasket.

13. A connector according to any of the preceding claims, comprising a plurality of connecting pins (28) protruding from said inner surface of said first connector part (14) and electrically connected to respective electrical connection points (32, 38) through respective conductive elements (30).

14. A lighting system comprising a linear lighting device (12) and a connector according to one or more of the preceding claims applied along the length of said linear lighting device (12).

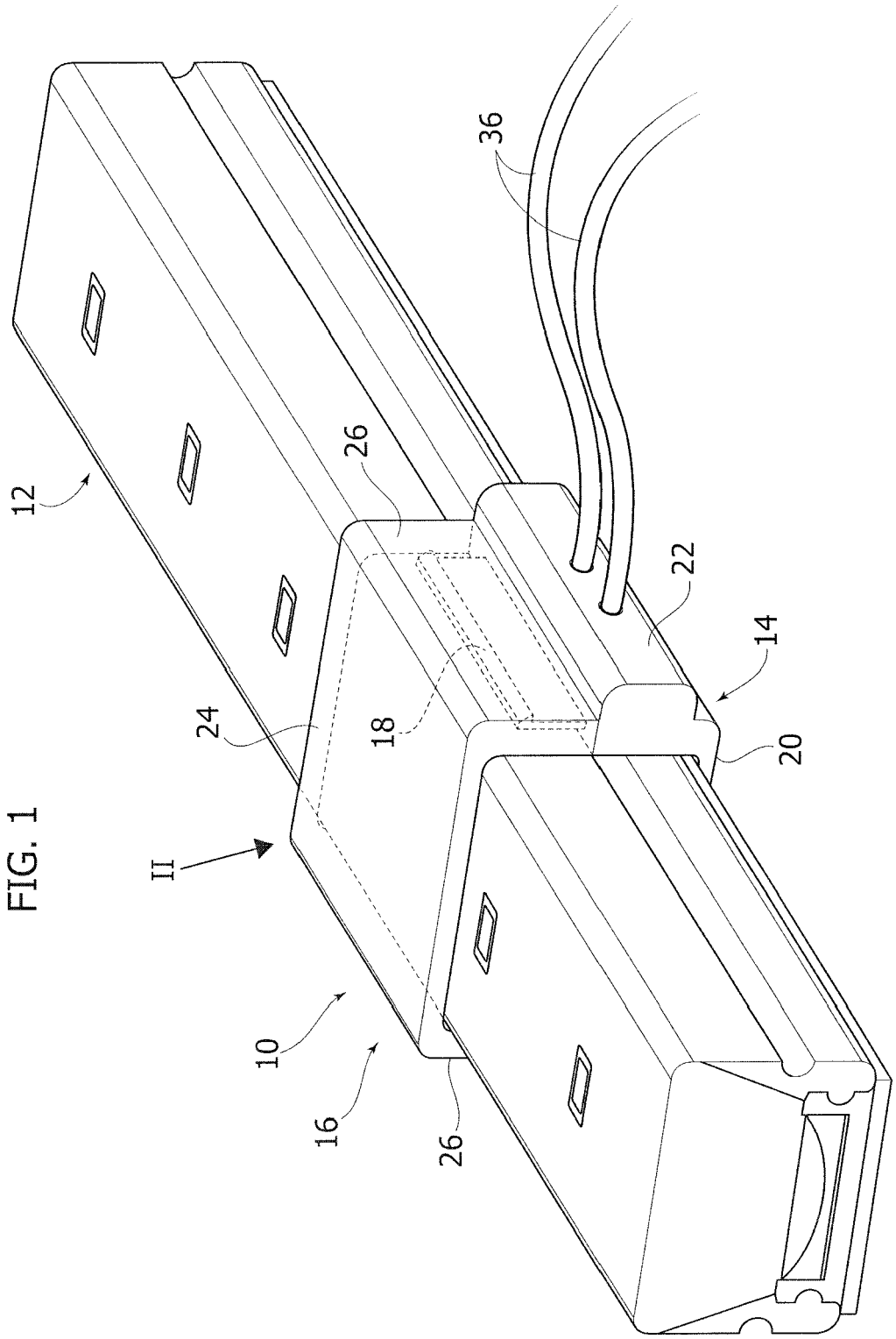

FIG. 1

FIG. 2

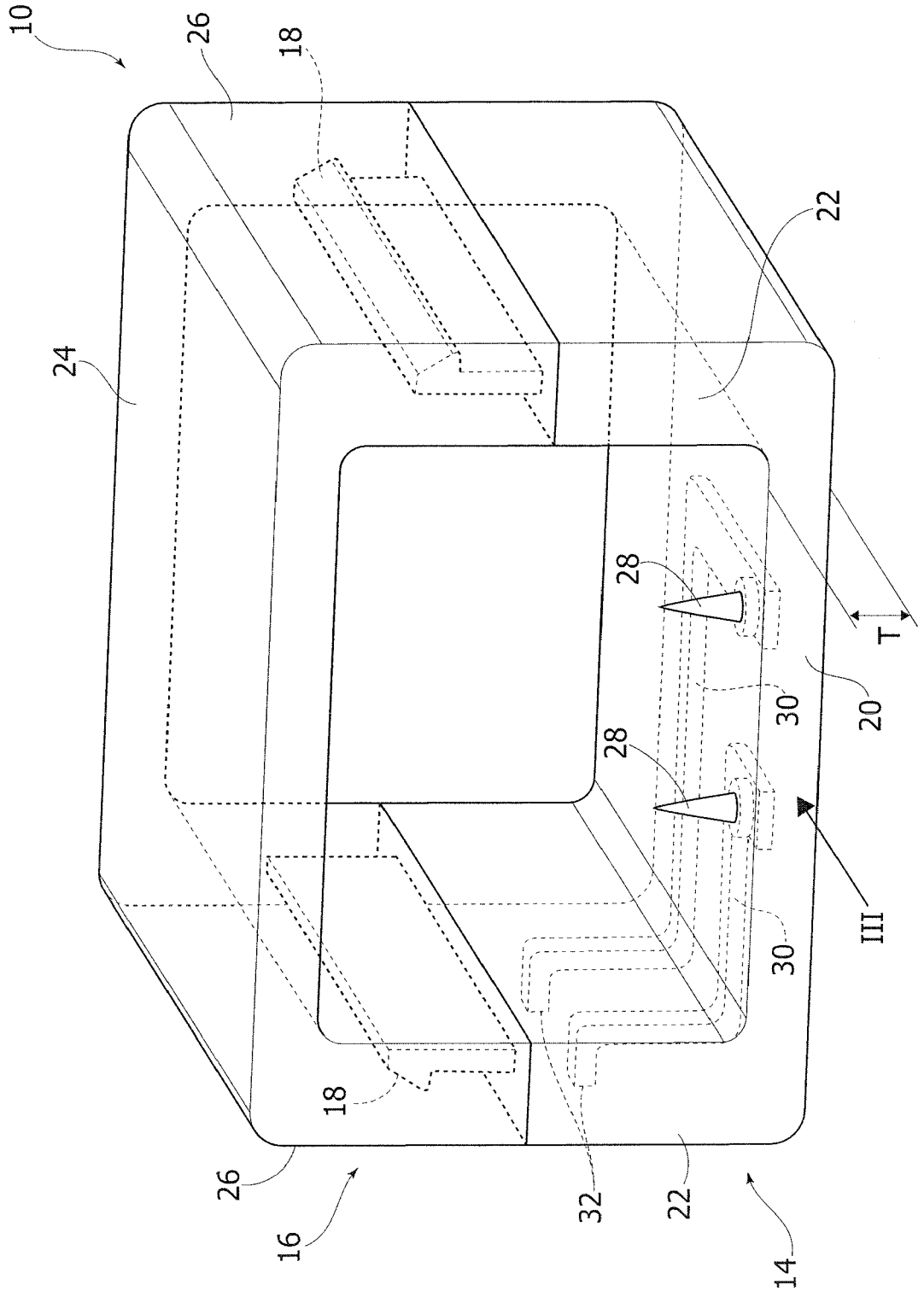

FIG. 3

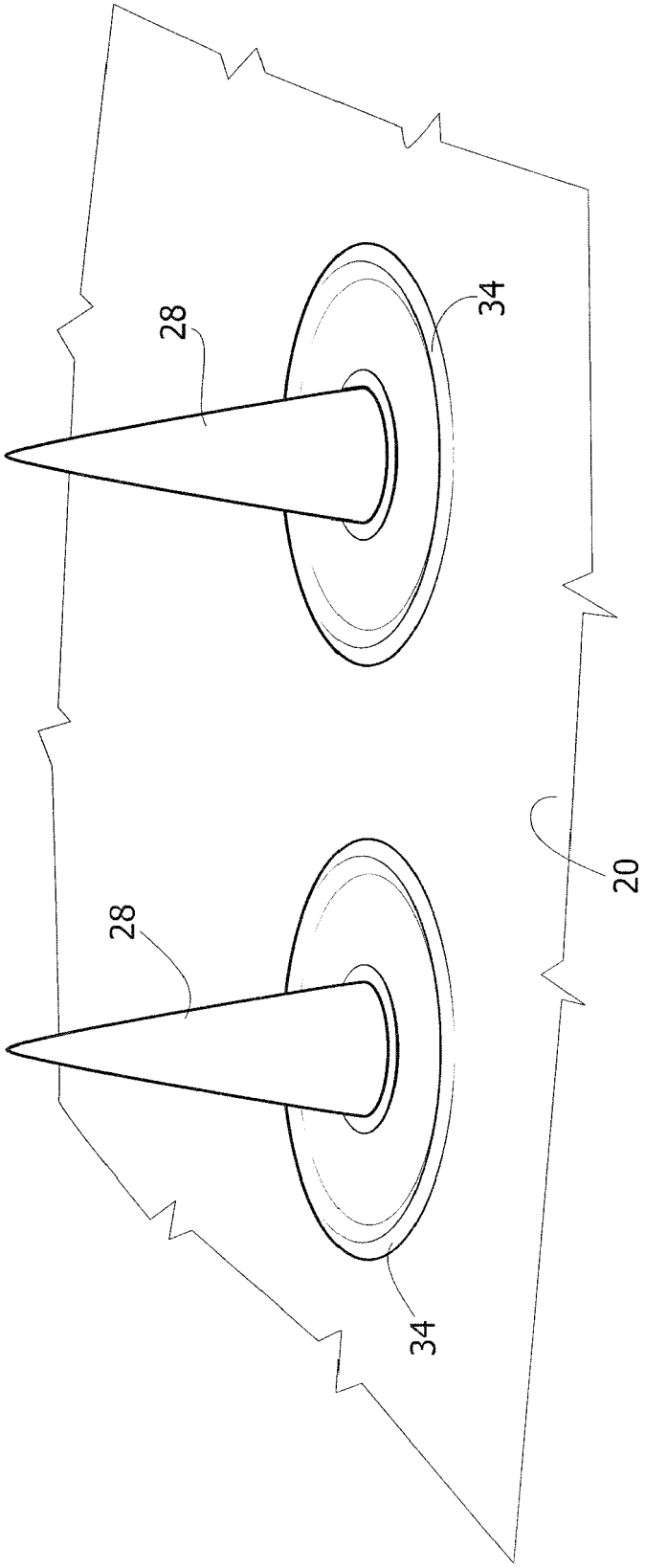

FIG. 5

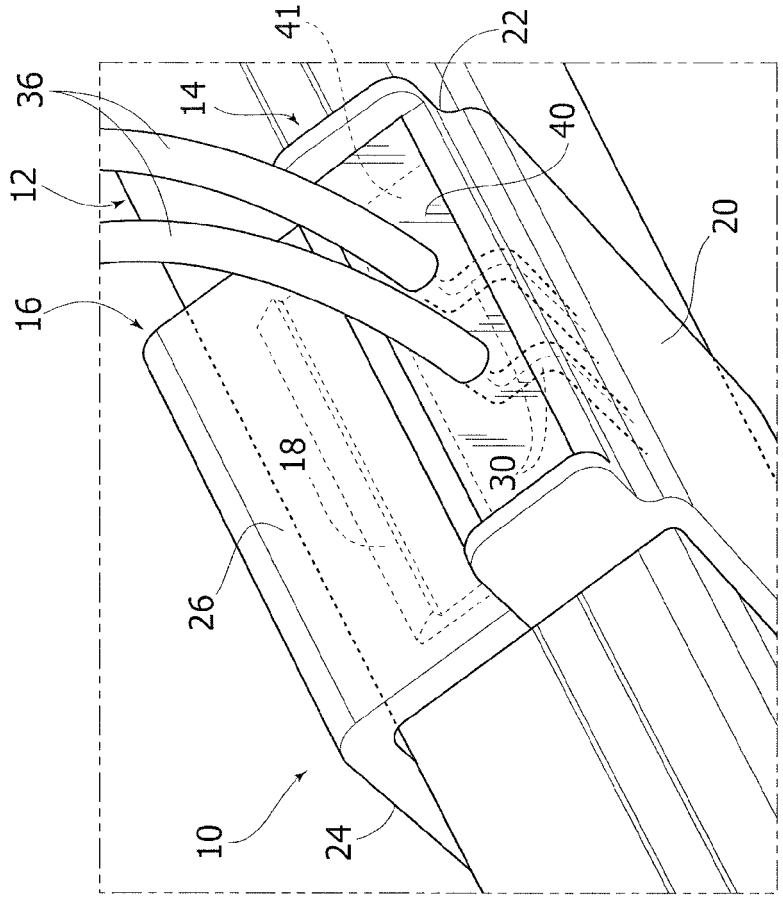
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FIG. 4

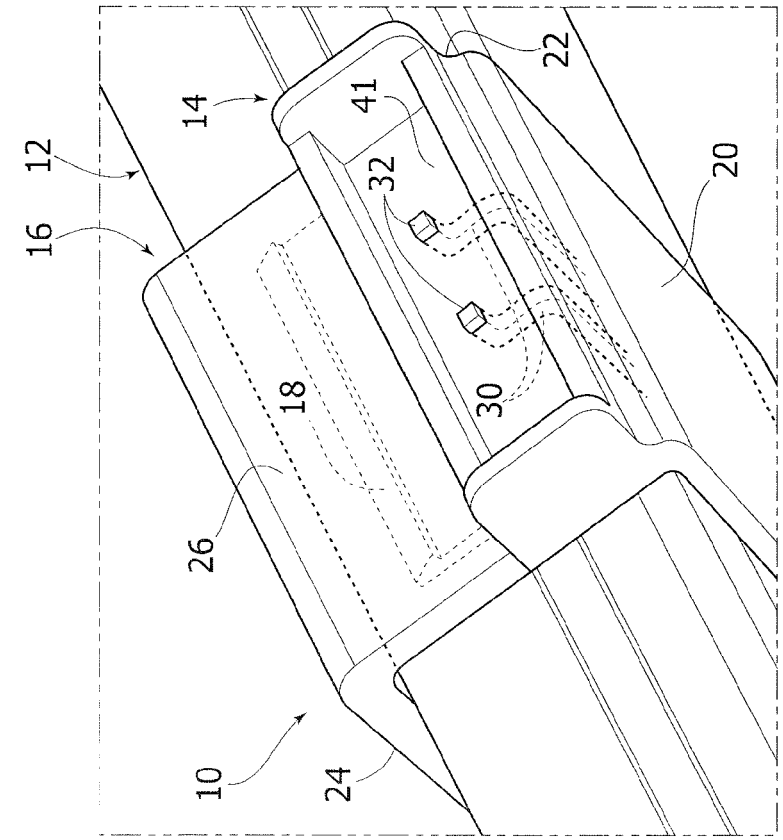
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FIG. 6

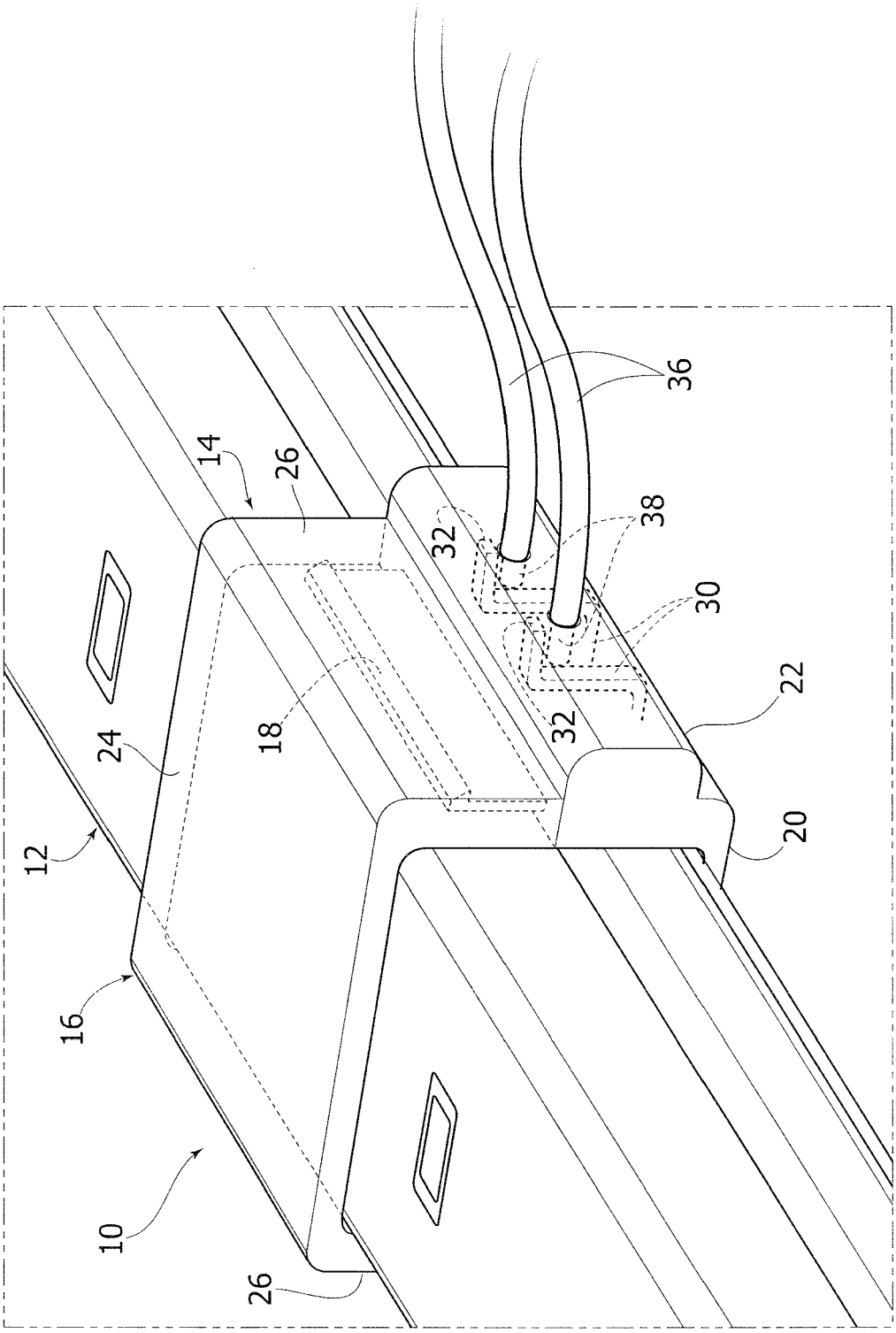
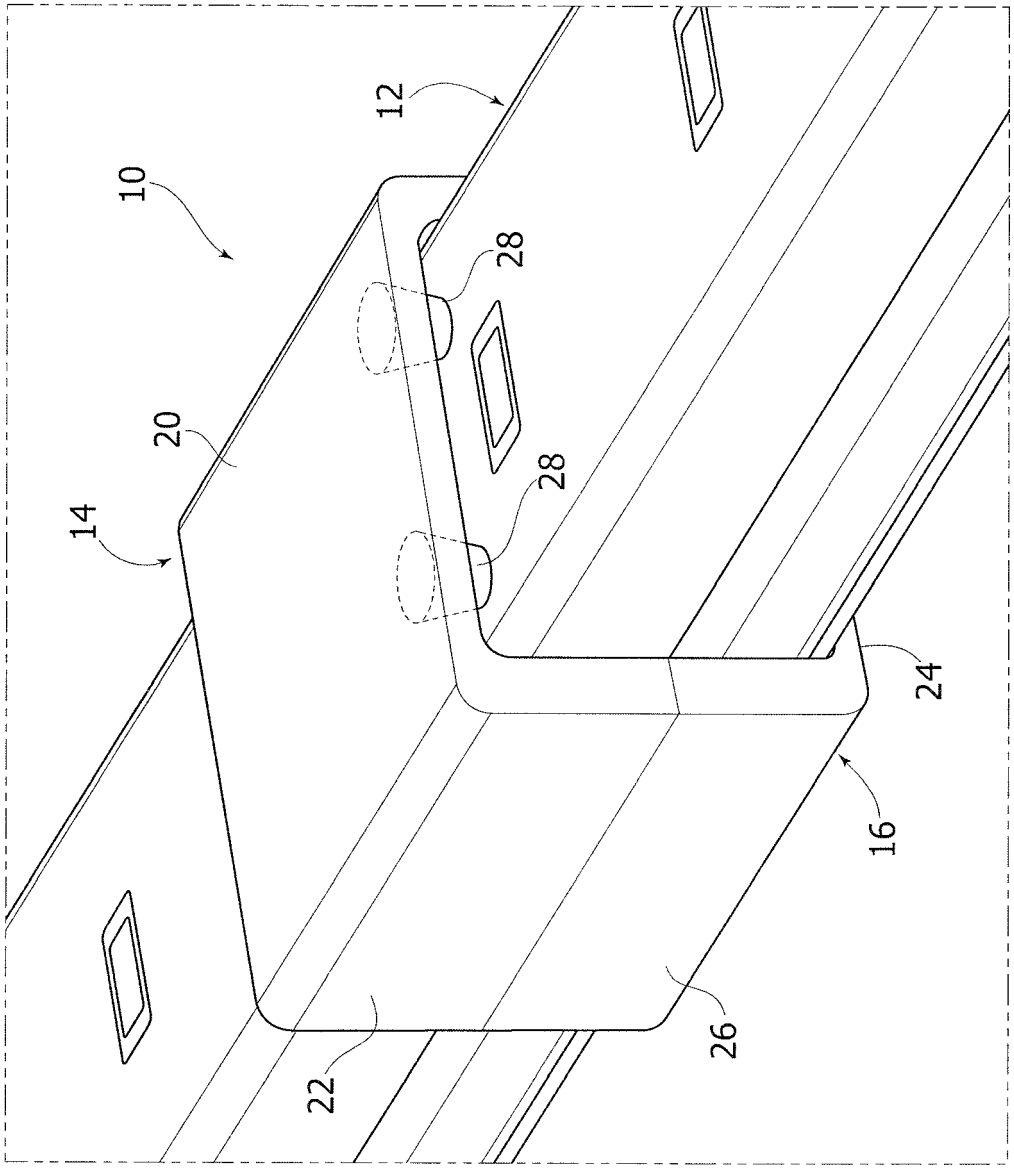


FIG. 7



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EUROPEAN SEARCH REPORT

Application Number
EP 18 21 4443

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 0 283 013 A2 (SUMITOMO ELECTRIC INDUSTRIES [JP]) 21 September 1988 (1988-09-21)	1-11,13, 14	INV. H01R11/20 H01R12/67
A	* figures 1-5 *	12	ADD.
X	WO 94/24728 A1 (SIEMENS AG [DE]; BAEUML ALFRED [DE]; FREIMUTH MICHAEL [DE]; SCHATZ WOL) 27 October 1994 (1994-10-27) * figures 1-9 *	1,2	H01R4/2404 H01R103/00 H01R13/506 F21V23/06 F21V21/002
X	US 9 647 349 B1 (STILLMAN JAMES [CN]) 9 May 2017 (2017-05-09) * figures 1-5 *	1	F21Y103/10 F21Y115/10
X	EP 0 734 108 A2 (IDL IND UND DESIGN LICHT GMBH [DE]) 25 September 1996 (1996-09-25) * figure 3 *	1	
A	EP 3 104 060 A1 (OSRAM GMBH [DE]; OSRAM S P A - SOCIETA' RIUNITE OSRAM EDISON CLERICI [] 14 December 2016 (2016-12-14) * figure 5 *	1	

TECHNICAL FIELDS SEARCHED (IPC)
H01R
F21V
F21S
F21Y

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	2 May 2019	Ferreira, João

CATEGORY OF CITED DOCUMENTS

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02-05-2019

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0283013 A2	21-09-1988	CA 1280479 C	19-02-1991
		DE 3883032 D1	16-09-1993
		DE 3883032 T2	05-01-1994
		EP 0283013 A2	21-09-1988
		JP H0821438 B2	04-03-1996
		JP S63231885 A	27-09-1988
WO 9424728 A1	27-10-1994	NONE	
US 9647349 B1	09-05-2017	CA 3025928 A1	07-12-2017
		US 9647349 B1	09-05-2017
		WO 2017210253 A1	07-12-2017
EP 0734108 A2	25-09-1996	AT 208091 T	15-11-2001
		DE 19510507 A1	26-09-1996
		EP 0734108 A2	25-09-1996
		GR 3034494 T3	29-12-2000
EP 3104060 A1	14-12-2016	CN 106252908 A	21-12-2016
		EP 3104060 A1	14-12-2016
		US 2016365688 A1	15-12-2016

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82